

# Retrospective Analysis of Various Methods of Induction of Labor in the Tertiary Care Hospital

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**Abstract:** *Background:* Aim of our study is to analyze the various methods for Induction of labor and to compare the effectiveness of mechanical, pharmacological and combination of both for the successful induction of labor. *Materials and methods:* A Retrospective study was conducted in the Dept of OBGY, GMC & ESIC Hospital, Coimbatore from Jan to June 2017. 87 patients at term with a Bishop's score <4 with various indications were divided into three groups-mechanical (group A), Pharmacological (group B) and combination of both (group C). Labor was augmented if required. Statistical analysis was done using Chi-square test and p value calculated. *Results:* All the three groups were comparable with respect to maternal Age, Gestational Age, Indications for induction, Bishop's score, mode of delivery and neonatal outcome. There was a significant difference in pre induction score for Group B [p 0.001], so the induction delivery interval is shortened in Group B compared to other two groups [p, 0.001]. No significant difference between the mode of induction and delivery outcome. [p=0.482]. Birth weights, APGAR Scores and NICU admissions showed no difference between three groups. *Conclusion:* No statistical difference exists between the three groups in our study except for the mean preinduction score and lesser induction delivery interval in pharmacological methods. Pharmacological methods are useful in slightly ripened cervix according to our study which decreases the I-D interval. Even though I-D interval is prolonged in mechanical methods, Foley catheter alone becomes more important cost reduction method of IOL in our setting especially in patients with oligohydramnios.

**Keywords:** Foley's catheter, Induction of labor, Induction - delivery interval

## 1. Introduction

Induction of labor [IOL] is common obstetric procedure with rising rates world wide. IOL is indicated if benefits of delivery outweigh the risk of continuing pregnancy. To increase the success of a vaginal delivery with an unfavorable cervix, several ripening methods can be applied that include mechanical and pharmacological options. Intracervical Foley catheter is recommended for induction of labor [moderate quality evidence, strong recommendation<sup>[1]</sup>. They are amongst the oldest methods to initiate labor<sup>[2]</sup>. It can cause mechanical dilatation of cervix and stimulates endogenous release of prostaglandins by stripping the fetal membranes and release of lysosomes from decidual cells<sup>[3]</sup>.

Pharmacological methods include use of cerviprime gel and misoprostol for induction of labor. PGE<sub>2</sub> (Dinoprostone) gel is the only prostaglandin approved by the US FDA for cervical ripening in Labor induction<sup>[4]</sup>. However this is expensive and requires cold storage.

PGE<sub>1</sub> is used widely for inducing labor. The effectiveness of misoprostol has been demonstrated, but several case reports have suggested that the rate of serious complications such as excessive uterine contractions and rupture may be increased compared with other methods<sup>[5]</sup>.

Research studies comparing the safety and effectiveness of different methods of cervical ripening are inconsistent, such that the optimal induction of labor remains unclear.

We therefore conducted a retrospective analysis of commonly used methods for induction of labor at term so that proper protocol, selection criteria of patients may be formulated in our unit in future.

## 2. Materials and Methods

The present study was carried out in the department of OBGY, GMC & ESIC HOSPITAL, Coimbatore for a period of 6 months from JAN to JUNE 2017. All patients with different indications for IOL were divided into three groups. Group A [mechanical-Foley's catheter n=33] group B [pharmacological-cerviprime gel n=19/misoprostol n=18, n=37] and group C [combination of both n=17]. There were total of 87 patients. The patients fulfilling the inclusion and exclusion criteria were analyzed.

The patients with singleton pregnancy, more than 37 weeks of gestation, primi and multigravida, cephalic presentation, bishop's score <4 with intact membranes are included in this study. Patients with multiple pregnancies, malpresentation, absent membranes, APH, previous uterine scar are excluded from our study.

Post induction bishop's score was assessed and if needed augmentation of labor was implemented by artificial rupture of membranes and oxytocin administration.

### *Foley's catheter:*

A 16 size Foley's catheter was introduced into the cervix with the help of speculum and sponge holding forceps and 60ml of distilled water was instilled into the balloon. The catheter was kept in place by applying the sticking plaster over it on the thigh. After 24 hrs, the catheter was removed and post induction score was assessed. If MBS < 6, [Modified Bishop's score] any one of the pharmacological agents are used, If MBS > 6 at 24hrs and was not in labor, augmentation of labor was done.

**Pharmacological method:**

PGE2 gel is available as a sterile preparation containing 0.5mg of Dinoprostone in a prefilled syringe with endocervical applicator. If post induction MBS<6, dose repetition was done. If MBS>6, labour was augmented if there is no spontaneous onset of labor.

Oral misoprostol 50mcg was given and dose was repeated after 4hrs according to post induction score and uterine contractions.

**3. Results**

Our unit had a total of 274 deliveries during the study period. 87 patients underwent induction of labor with different methods. Group A had 33, Group B had 37 and Group C had 17 patients. All the three groups were comparable with respect to maternal age, gestational age, indications for induction, pre and post induction Bishop's score, need for augmentation, mode of delivery and neonatal outcome was assessed. Statistical analysis was done using chi-square test. Differences with a P value of <0.05 was considered statistically significant.

Most of the patients in our study fall between 23-28 years. Youngest patient in our study was 18 years and the oldest patient was 33years. no statistically significant difference exists between the age and gestational age between the three groups [Table 1].

**Table1: Demographic profile**

Variable	Group A (n=33)	Group B (n=37)	Group C (n=17)	P
Maternal age	24.61	25.97	24.29	0.117
Gestation age	39.34	39.09	38.94	0.655
<b>Indication for induction</b>				
Post EDD	17(51.5%)	13(35%)	11(64.8%)	-
Oligohydramnios	11(33.3%)	10(27.02%)	4(23.5%)	-
GDM	1(3%)	5(13.5%)	-	-
Gest HT	3(9%)	5(13.5%)	2(11.7%)	-
Others	1(3%)	4(10.8%)	-	-

Most commonest indication for IOL in our study was post EDD (47.1%) and next commonest was oligohydramnios (28.7%) [Table 1]. Delivery outcome and mode of induction were analyzed in patients with oligohydramnios. No statistically significant difference exists between the three groups [p=0.704]

In this present study, there was a statistically significant difference exists in mean preinduction score of 3.35 in Group B compared to other groups [p-0.001]. This indicates that we have selected pharmacological method of IOL for slightly ripened cervix [MBS 2, 3]. For the unripe cervix with poor Bishop's score [MBS 0, 1], best method of IOL will be Foley's catheter or combination of both.

**Table 2: Change in Bishop's score**

Bishop's score	Group A (n=33)	Group B (n=37)	Group C (n=17)	P
Mean pre-induction score	2.88	3.35	2.29	0.001
Mean post-induction score	7.79	7.91	8.24	0.787

Primigravidas are involved in large numbers (57.5%) in our study compared to multigravidas (42.5%)[p=0.048][Table 3].

**Table 3: Type of Induction and parity**

Parity	Group A (n=33)	Group B (n=37)	Group C (n=17)	Total
Primi	21(63.6%)	16(43.2%)	13(76.5%)	57.5%
Multi	12(36.4%)	21(56.8%)	4(23.5%)	42.5%

Chi square value: 6.088 p value=0.048

**Table 4: Need for Augmentation**

Type of augmentation	Group A (n=33)	Group B (n=37)	Group C (n=17)
Spontaneous	2(6%)	11(29.8%)	2(11.7%)
ARM	6(18%)	3(8%)	4(23.5%)
Oxytocin	2(6%)	2(5.4%)	1(5.8%)
ARM + oxytocin	23(70%)	21(56.8%)	10(60%)

Chi square value: 8.782 p value: 0.186

The need for further augmentation of labor was studied in this study [table 4]. spontaneous labor ensued in 6%, 29.7%, and 11.7% in Group A, B, C respectively. Need for ARM is 18%, 8%, 23.5% in Group A,B,C respectively. Need for oxytocin alone is 6%, 5.4%, and 5.8% in three groups respectively. Need for ARM and oxytocin is 69.6%, 56.7%, 58.8% in Group A, B C respectively. Most of the patients in our study group were augmented with ARM and oxytocin. 6 patients had spontaneous rupture of membranes, 4 of them expelled Foley spontaneously. No significant difference in need for augmentation exists between three groups [p-0.186]

**Table 5: Mode of delivery**

Variable	Group A (n=33)	Group B (n=37)	Group C (n=17)	Total
Lab natural	20(60.6%)	27(72.5%)	10(58.8%)	67.4%
LSCS	13(39.4%)	10(27.5%)	7(41.2%)	32.6%
Chi square =3.472		P value=0.482		
Induction-Delivery interval	19.30	9.35	27.19	<0.001

Table 5 shows no significant statistical difference exists for mode of delivery among three groups.[p=0.482] Group A had 60.6%[n=20] Group B had 75%[n=27] and group C had 58.8%[n=10]. Total no of spontaneous vaginal deliveries are 67.4%[n=57]. Group A had 40%[n=13], Group B had 22.2%[n=10], Group C had 41%[n=7] caesarean deliveries. Total no of caesarean deliveries are 32.6% [n=30]. Commonest indication for LSCS is non progression of labor and fetal distress. Other indications being deep transverse arrest, persistent right occipito posterior position, CPD minor and failed induction.

Induction delivery interval shows significant difference in p value <0.001. 19.30 hrs for Group A, 9.35hrs for Group B and 27.19 hrs for Group C respectively. I-D interval for Group B is comparatively less because mean preinduction Bishop's score is 3.35.

**Table 6:** Neonatal Outcome

Variable	Group A (n=33)	Group B (n=37)	Group C (n=17)	P
Birth weight	2.89	2.96	2.80	0.465
MSAF	4	1	4	-
1 min APGAR<7	12	11	5	-
5min APGAR<7	-	2	4	-
Neonatal admission	6	4	6	-

No significant difference exists between the study groups with respect to birth weight, NICU admissions, Apgar score and meconium stained amniotic fluid.

#### 4. Discussion

Results of this study show that all the three groups are equally effective in pre induction cervical ripening. Mean pre induction score was 3.35 for Group B which was statistically significant. However a comparison between the groups for post induction score did not confer a statistically significant advantage over other [p=0.787]. Similar were the observation from the study conducted by Alam A and Ahmed et al.<sup>[9]</sup> There have been a theoretic concerns regarding the introduction of infection with Foley catheter. In this study there was no infectious morbidity which is same as observation made by st.onge and conners, Jozwiak M and Anthony C et al<sup>[6,7,8,10]</sup>. In our study, next to Post EDD, most common indication for IOL is oligohydramnios. In group A,B,C there were about 11,10,4 patients of oligohydramnios respectively. Even though there was no statistically significant difference between the mode of induction and delivery in patients with oligohydramnios, Foley's catheter is safer method of IOL compared to pharmacological methods which is similar to observation made by Wenyang Wang et al<sup>[11]</sup>.

Exact time period for which the catheter is to be kept inside is not always known, but a variable time period is allowed. In our series, balloon was kept inside the cervical canal for 24hrs same as study conducted by Sudha Sharma and Madhan et al<sup>[12]</sup>. It is because we have kept the Foley for 24hrs, I-D interval is prolonged in Group A and C. Recently conducted PROBAAT trial in Netherlands has evaluated cost effectiveness of IOL at term with Foley catheter [FC] compared to PGE2 gel<sup>[13]</sup>. FC group had higher costs due to longer labor ward stay and less cost related to induction materials and neonatal admissions. They have concluded that FC and PGE2 gel labor induction generate comparable costs. In a setting where cost of laborward stay is relatively less due to cheaper cost like our hospital, FC seems to be a cost effective method. A study from India shows vaginal misoprostol is a cheap, highly effective agent for IOL<sup>[14]</sup>. This indicates that FC and misoprostol has some economic advantages over PG gel. Eventhough in our study we have used Misoprostol alone for 21 patients, we need to emphasize on the Foley catheter to be more important method of IOL in our setting.

Subjects who were primed with FC followed by PGs after 24hrs had a higher chance of getting a vaginal delivery. Total vaginal delivery rate in Group A and C was 55%. Total vaginal delivery rate is 75% in FC alone and FC+PGs in the study conducted by patabendige and Jeyawardhana et

al<sup>[15]</sup>. we have to increase the vaginal delivery rate in Group A and C. In our study, we have inserted Foley catheter 24hrs after which according to bishop's score, pharmacological method of IOL was given if MBS<6. But randomized clinical trial conducted by LISA LEVINE et al demonstrated that MISO-FOLEY combination to be superior method with women twice as likely to deliver before those who received either Miso or cervical Foley alone. There were a higher proportion of women delivered by 12hrs and by 24hrs with combination methods<sup>16</sup>. In our study we have used Foley and then followed by pharmacological method. Our future project will be based on the simultaneous use of combination of mechanical and pharmacological methods of IOL which is similar to the above study<sup>[16]</sup>.

In our study, 55-70% of the patient in all the three groups required augmentation with ARM and syntocinon drip. Most common indication for LSCS was non progression of labor in group A and B, fetal distress in group C respectively. There was no association of increased rate of caesarean section with all the three groups.

Fetal outcome data showed no significant difference between Group A, B and C with respect to birth weight mean birth weight 2.89, 2.90, 2.80 respectively, MSAF [4, 1, 4 respectively], 1min APGAR SCORE [12, 11, 5 respectively], 5min APGAR SCORE [0, 2, 4 respectively], NICU admission [7, 6, 4 respectively]. Thus the present study shows that the fetal outcome results were also comparable in all the three groups.

#### 5. Conclusion

In conclusion this study has shown that except for the preinduction score and I-D interval which shows significant difference in group B other factors like need for augmentation, mode of delivery, neonatal outcome were similar in all the three groups. Foley's catheter is an effective method of induction of labor for patients with poor Bishop's score in low resource settings. Foley alone could be an effective method of IOL for the subjects with oligohydramnios as the other methods will have impact on fetal well being.

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